STS-102 (BI106)
FLIGHT READINESS REVIEW

PROGRAM

February 27, 2001

Solid Rocket Booster

United Space Alliance

AGENDA

Presenter:
Roger Elliott

Organization/Date:
USA-SRB/2-27-01

- STS-98/BI105 Postflight Assessment Summary
- Changes Since STS-98/BI105
- Technical Issues
  - Cable Inspection
  - Upper Strut Connector
- Readiness Assessment

STS-98 POSTFLIGHT ASSESSMENT SUMMARY

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- No OMRSD or LCC violations
- SRB postflight hardware and data evaluation complete
- No IFAs
- All SWARs fired properly
- No stud hang-ups observed
- BSM disassembly and graphite throat inspection complete, no cracks found
- No cable handling damage

CLASS I CHANGES SINCE STS-98

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First Flight of BST Battery

- Equivalent to Eagle Picher (EP) Battery
  - Same footprint, weight, power connector, cell configuration, and capacity
- Design deltas
  - BST battery has longer wet stand time - 109 days vs. EP 90 days
  - Addition of external monitoring connector used during activation in battery lab
- Fly in both DFI positions on STS-102
- Qualified by test

CLASS I CHANGES SINCE STS-98

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Multiple Booster Separation Motor (BSM) Change Summary

- Environmentally unacceptable materials replaced
  - Hand wipe cleaner, adhesive and Loctite primer
- Adds alternate dye penetrant inspection, radiographic examination and passivation specifications
  - Obsolete documents replaced by ASTM Specifications
- Kirkhill Rubber approved as supplier of BSM insulator rubber
- Reduces insulator to closure bondline adhesive
  - Reduces deep voids within thick adhesive bondline which have caused insluator splits
- Qualified by test

TECHNICAL ISSUE
CABLE INSPECTION/INVESTIGATION

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STS-102/BI106 Cable Inspection and Testing Complete

- All 12 aft separation bolt (strut firing line) cables removed and replaced
- X-ray and electrical checks complete on 36 reusable systems tunnel cables, all reusable forward separation bolt cables and all reusable RSRM igniter cables
  - Electrical checks included continuity, IR, DWV and wiggle tests
  - One suspect systems tunnel cable changed out
    - Cable dissection revealed no anomalous condition after removal
    - Replacement cable x-rayed, continuity, IR, DWV and wiggle tested

TECHNICAL ISSUE
UPPER STRUT CONNECTOR

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Torque Stripe Misaligned on Connector Insert to Adapter on Upper Strut Ordnance Cables of STS-100

Observation

- Interface between connector insert and adapter moved during torquing of adapter jam nut
  - Pigtail connects ETAR cable to system “B” NSI, ET side
  - Broken torque stripe found between connector insert and adapter

Concern

- Rotation could cause damage to conductors

Discussion

- Torque stripe condition verified by technician, USA and NASA Quality on STS-102 upper struts prior to final assembly
- Post-installation electrical testing verifies continuity

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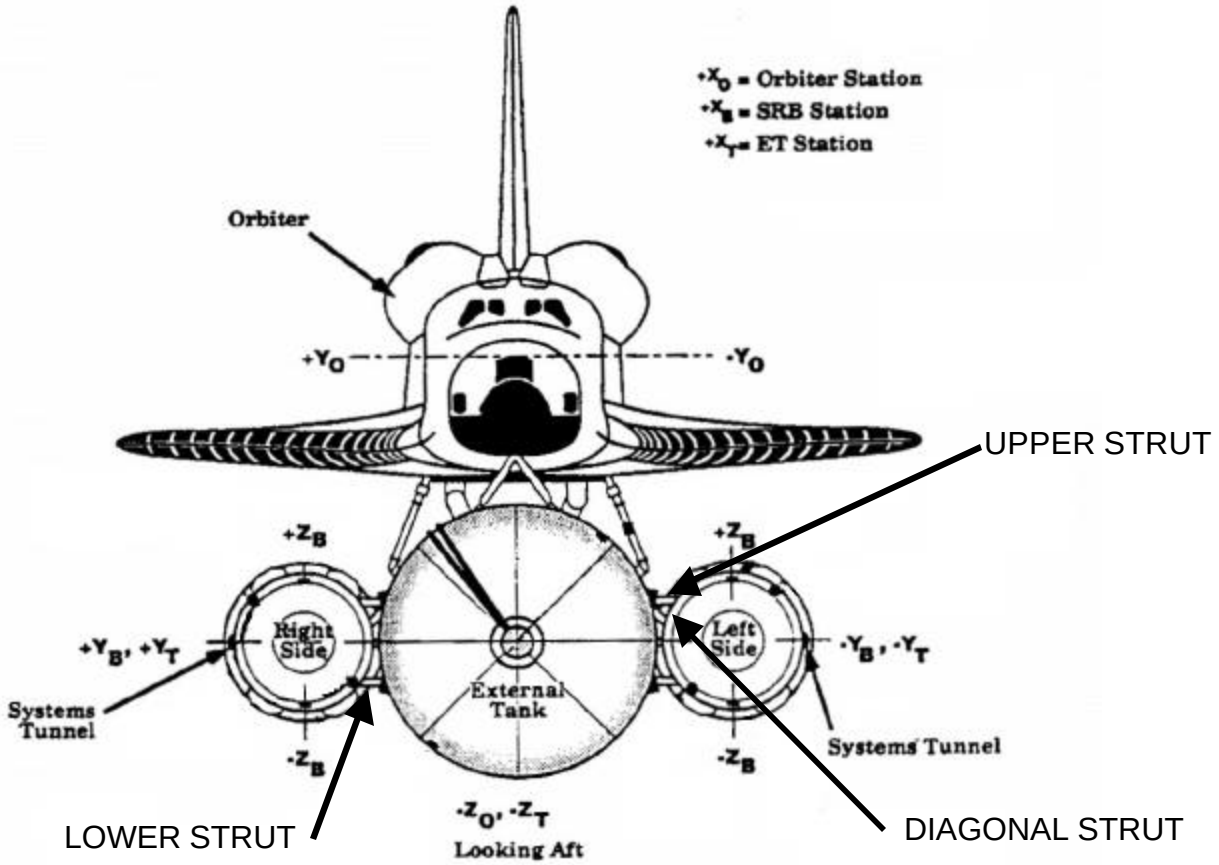

STRUT LOCATIONS

STS-102/106-107

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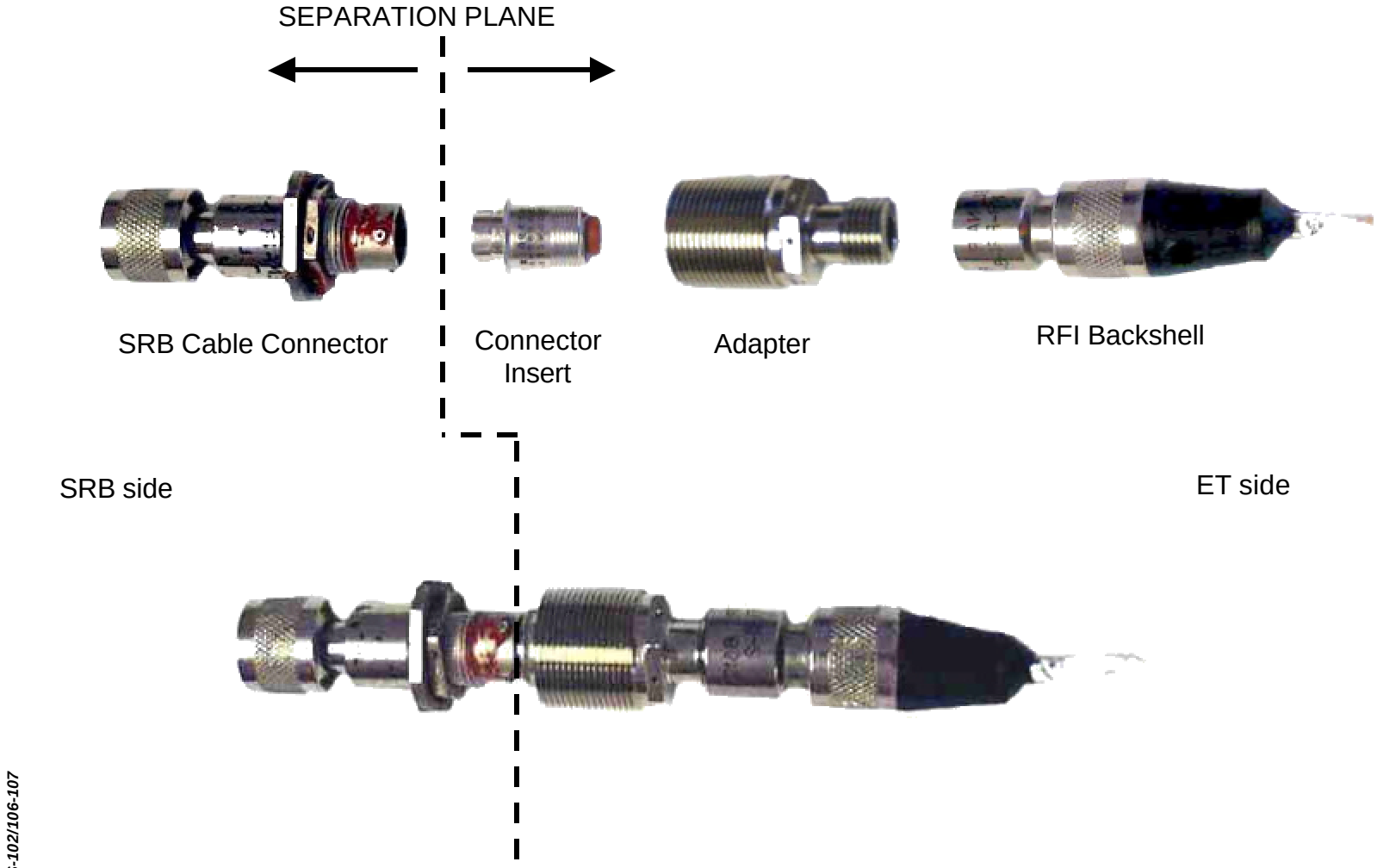

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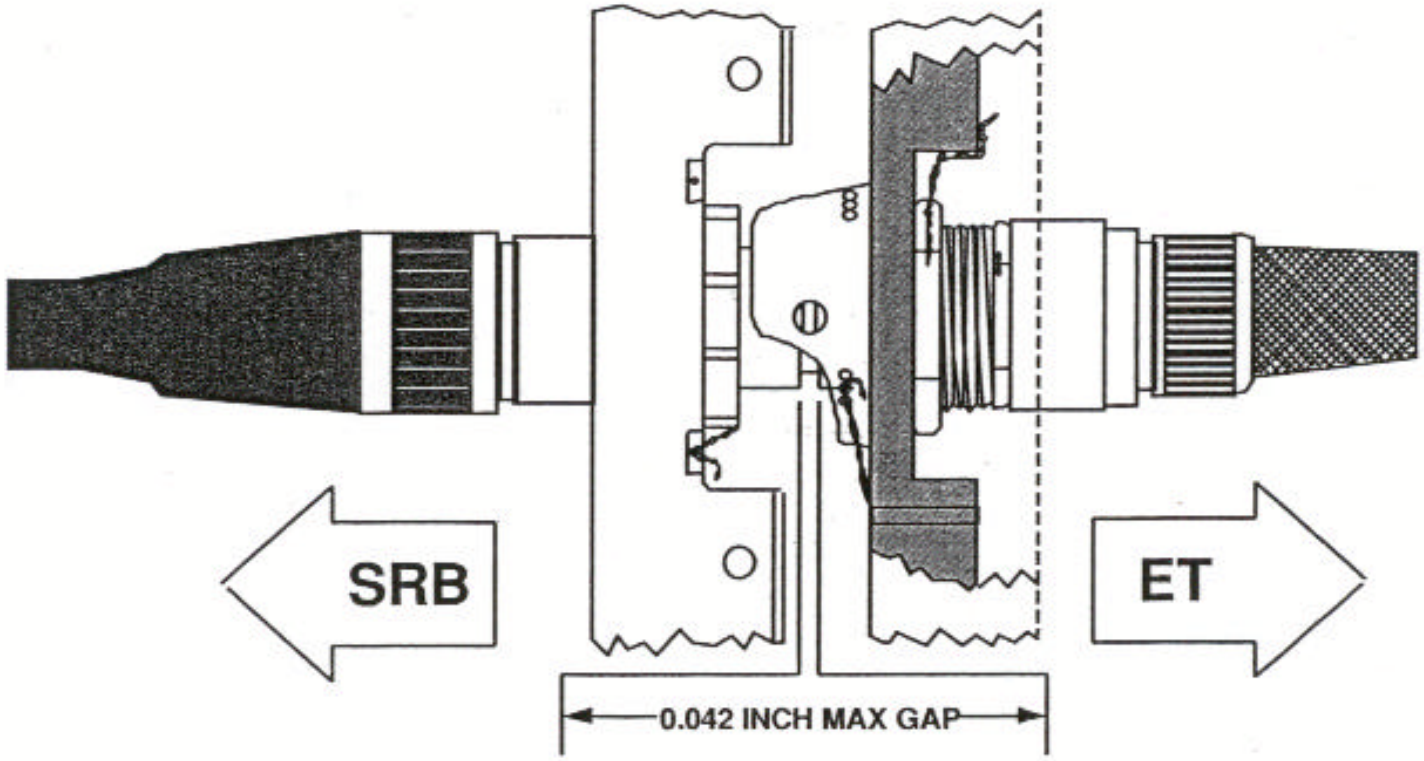

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Torque Strip Misaligned on Connector Insert to Adapter on Upper Strut Ordnance Cables of STS-100 (cont.)

Discussion (cont.)

- Testing performed to determine potential rotation of insert/adapter interface in break-away and torque direction and amount of rotation required to break conductors
  - First test (all tests conducted while continuously monitoring continuity)
    - De-torqued connector insert from adapter in breakaway direction
    - Torqued connector insert to adapter (25-30 in-lbs)
      - Verified relative position of torque stripe
    - Torqued connector insert to adapter (40-45 in-lbs)
    - De-torqued connector insert from adapter in breakaway direction until gap of 0.042 in axial direction between connector insert flange and adapter (approximately one full turn)
    - Successfully passed vibration testing (simulated launch and boost phases)

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Torque Strip Misaligned on Connector Insert to Adapter on Upper Strut Ordnance Cables of STS-100 (cont.)

Discussion (cont.)

- Verified continuity, IR and DWV
- Tightened connector insert to adapter until original position attained
- Un-screwed adapter from connector insert until continuity lost at approximately two complete rotations

- Second test (all tests conducted while continuously monitoring continuity)
  - De-torqued connector insert from adapter in breakaway direction until gap of 0.042 in axial direction between connector insert flange and adapter (approximately one full turn), maintained continuity
  - Unscrewed adapter from connector insert until continuity lost at approximately two complete rotations
- Test results
  - Both failures resulted in one conductor failing
    - Shield and other conductor maintained continuity
  - Snap noise heard at failure of conductor
  - Conductor did not regain continuity

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Rationale for Flight

- STS-100 condition caught and resolved during assembly
- Torque stripe installation verified by inspection
- Test results indicate approximately two complete rotations required to break conductor
- Installation torque cannot rotate interface to failure
- Failure of conductor would be found during testing
- Cables are single-mission use
- Redundant system by design
- No risk to flight safety or mission success

READINESS ASSESSMENT

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- Pending completion of standard open work, there are no constraints to flight for STS-102